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EXAMINER

NOTE, JANIS L

|          |              |
|----------|--------------|
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1756

DATE MAILED: 10/30/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

10/606,750

Applicant(s)

TODA ET AL.

Examiner

Janis L. Dote

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 26 September 2006.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1,7-26 and 28 is/are pending in the application.
- 4a) Of the above claim(s) 24-26 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1,7-23 and 28 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☒ Claim(s) 1,7-26 and 28 are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All    b) ☐ Some \*    c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)   | 5) <input type="checkbox"/> Notice of Informal Patent Application                       |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)<br>Paper No(s)/Mail Date <u>9/26/06</u> | 6) <input type="checkbox"/> Other: _____  |

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1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicants' submission filed on Sep. 26, 2006, has been entered.

2. The examiner acknowledges the amendments to claims 1 and 28, and the cancellation of claim 29 set forth in the amendment filed on Sep. 26, 2006. Claims 1, 7-26, and 28 are pending.

3. Claims 24-26 have been withdrawn from further consideration pursuant to 37 CFR 1.142(b), as being drawn to a nonelected invention, there being no allowable generic or linking claim. Applicants timely traversed the restriction (election) requirement in the reply filed on Nov. 23, 2005.

Applicants are reminded that if the product claims are found to be allowable, pursuant to the procedures set forth in the Official Gazette notice dated March 26, 1996 (1184 O.G. 86), process claims 24-26, which do not depend from or otherwise

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include all the limitations of the allowable product, will NOT be rejoined.

4. The examiner has crossed-out the reference US 2002/0076633 A1, listed on the form PTO-1449 filed in the Information Disclosure Statement (IDS) on Sep. 26, 2006, because it is already of record. See the examiner-initialed form PTO-1449 filed in the IDS on Nov. 28, 2003, which is attached to the office action mailed on Jan. 25, 2005.

The IDS filed on Sep. 29, 2006, fails to comply with 37 CFR 1.98(a)(2), which requires a legible copy of each cited foreign patent document; each non-patent literature publication or that portion which caused it to be listed; and all other information or that portion which caused it to be listed. It has been placed in the application file, but the information referred to therein has not been considered. Applicants did not provide copies of the Japanese patent documents. Applicants merely provided an English abstract from the "Patent Abstracts of Japan" describing JP 63-077059, which is already of record. See the examiner-initialed form PTO-1449 filed in the IDS on Nov. 28, 2003, which is attached to the office action mailed on Jan. 25, 2005.

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Applicants are advised that the date of any re-submission of any item of information contained in this information disclosure statement or the submission of any missing element(s) will be the date of submission for purposes of determining compliance with the requirements based on the time of filing the statement, including all certification requirements for statements under 37 CFR 1.97(e). See MPEP § 609.05(a).

5. The objections to claims 1 and 29 set forth in the office action mailed on May 26, 2006, paragraph 6, have been withdrawn in response to the amendment to claim 1 and the cancellation of claim 29 filed on Sep. 26, 2006.

The terminal disclaimer filed on Aug. 25, 2006, disclaiming the terminal portion of any patent granted on this application, which would extend beyond the expiration date of US Patent No. 7,029,810 has been reviewed and is accepted. The terminal disclaimer has been recorded.

Accordingly, the rejection of claims 1, 7-23, 28, and 29 under the judicially created doctrine of obviousness-type double patenting over claims 1-35 of US Patent No. 7,029,810 B2 (Toda), set forth in the office action mailed on May 26, 2006, paragraph 19, has been withdrawn.

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The rejections under 35 U.S.C. 103(a) of claims 1, 7-23, 28, and 29 over US 6,268,096 B1 (Nukada) combined with the other cited prior art, set forth in the office action mailed on May 26, 2006, paragraphs 9-12, have been withdrawn in response to the amendments to claims 1 and 28 filed on Sep. 26, 2006. The amendments to claims 1 and 28 added the limitation that the titanyl phthalocyanine has an X-ray diffraction spectrum, wherein "said titanyl phthalocyanine has a peak at an angle of  $9.5^{\circ}$  and a peak at an angle of  $9.7^{\circ}$ ." For the reasons noted by applicants in their response filed on Sep. 26, 2006, page 16, the X-ray diffraction spectrum of the Nukada titanyl phthalocyanine shown in Fig. 4 of Nukada does not show peaks at a Bragg angle of  $9.5^{\circ}$  and at an angle of  $9.7^{\circ}$  as required in instant claims 1 and 28. In addition, the Rule 132 declaration, which was executed by Tasuya Niimi, one of the inventors of the instant application, on Sep. 20, 2006, filed on Sep. 26, 2006, states that "there is no Bragg angle X-ray diffraction peak in expanded Figure 4 [of the Nukada titanyl phthalocyanine] at an angle of  $23.5^{\circ} \pm 0.2^{\circ}$ ." The peak at an angle of  $23.5^{\circ} \pm 0.2^{\circ}$  is required in instant claims 1 and 28.

The rejections under 35 U.S.C. 103(a) of claims 1, 8-23, 28, and 29 over Japanese Patent 11-140337 (JP'337) combined with the other cited prior art, set forth in the office action mailed

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on May 26, 2006, paragraphs 14-17, have been withdrawn in response to the amendments to claims 1 and 28 filed on Sep. 26, 2006, as described supra. The X-ray diffraction spectrum of the JP'337 titanyl phthalocyanine shown in Fig. 1 of JP'337 does not appear to show a peak at a Bragg angle of  $9.5^{\circ}$  and a peak at a Bragg angle of  $9.7^{\circ}$  as required in instant claims 1 and 28. Nor is there enough information on the present record to reasonably presume that the X-ray diffraction spectrum of the JP'337 titanyl phthalocyanine exhibits such peaks.

6. The instant specification at page 12, lines 14-21, discloses that the term "surface roughness" recited in the instant claims "means the ten point mean roughness which can be measured by a method based on JIS B0601. Specifically, the roughness is represented by the difference between the average height of the five projected portions and the average depth of the five recessed portions in a unit length."

7. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

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8. Claims 1, 7-23, and 28 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter, which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

(1) Instant claims 1 and 28 recite that the titanyl phthalocyanine X-ray diffraction spectrum has "a peak . . . at an angle of  $23.5^{\circ} \pm 0.2^{\circ}$ ."

The originally filed specification does not provide an adequate written description of such a peak at an angle of  $23.5^{\circ} \pm 0.2^{\circ}$ . The originally filed specification at page 6, lines 11-20, describes a titanyl phthalocyanine having an X-ray diffraction spectrum having a maximum peak at a Bragg (2 $\theta$ ) angle of  $27.2^{\circ} \pm 0.2^{\circ}$ , "a lowest peak at an angle of  $7.3^{\circ} \pm 0.2^{\circ}$ , and no peak at an angle from  $7.4^{\circ}$  to  $9.4^{\circ}$  (i.e., an interval between the lowest angle peak to a next peak at a high angle side is not less than  $2.0^{\circ}$ )," and no peak at an angle of  $26.3^{\circ}$ . In synthesis example 1, the originally filed specification discloses that the resultant titanyl phthalocyanine has an X-ray diffraction spectrum having a maximum peak at a Bragg (2 $\theta$ ) angle of



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$27.2^{\circ} \pm 0.2^{\circ}$  and a lowest peak at an angle of  $7.3^{\circ} \pm 0.2^{\circ}$ . The originally filed specification states that no peaks are observed at angles "from  $7.4^{\circ}$  to  $9.4^{\circ}$  (i.e., the interval between the lowest angle peak to a next peak at a high angle side is  $2.0^{\circ}$  or more)" and no peak is observed at an angle of  $26.3^{\circ}$ . See the originally filed specification at page 66, lines 5-14, and Fig. 13. Table 1 at page 71 of the originally specification reports that the X-ray diffraction spectrum of the titanyl phthalocyanine in synthesis example 1 has a maximum peak at a Bragg ( $2\theta$ ) angle of  $27.2^{\circ}$ , a lowest peak at an angle of  $7.3^{\circ}$ , a peak at an angle of  $9.4^{\circ}$ , a peak at an angle of  $9.6^{\circ}$ , no "peak in a range of  $7.4^{\circ}$  to  $9.6^{\circ}$ ," and no peak at an angle of  $26.3^{\circ}$ . The originally filed specification does not appear to provide any description of a titanyl phthalocyanine X-ray diffraction spectrum having a peak at an angle of  $23.5^{\circ} \pm 0.2^{\circ}$  as recited in instant claims 1 and 28.

In the amendment filed on Feb. 22, 2006, applicants assert that the limitation that the X-ray diffraction spectrum has a peak at an angle of  $23.5^{\circ} \pm 0.2^{\circ}$  is "supported, for example, by the Figures." However, applicants' assertion does not appear to be supported by the evidence of record. Applicants have not indicated where in the originally filed specification, by page and line number, there is a description of the peak at

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$23.5^{\circ} \pm 0.2^{\circ}$ . Nor have applicants provided any objective evidence to show that the X-ray diffraction spectra in the "Figures" exhibit such a peak. As noted in the office action mailed on May 26, 2006, paragraph 9, page 8, the titanyl phthalocyanine X-ray diffraction spectrum in Fig. 4 of Nukada appeared to exhibit a peak at an angle of  $23.5^{\circ}$ . In the response filed on Aug. 25, 2006, page 16, lines 7-9, applicants asserted that the "spectrum of Fig. 4 [of Nukada] has no  $23.5^{\circ}$  peak . . . . Namely, a projection observed [in Fig.4] at an angle slightly lower than  $23.5^{\circ}$  is not a peak" (emphasis in the original). Furthermore, as noted in paragraph 5, supra, the Rule 132 declaration, which was executed by Tasuya Niimi, one of the inventors of the instant application, on Sep. 20, 2006, filed on Sep. 26, 2006, states that "there is no Bragg angle X-ray diffraction peak in expanded Figure 4 [of the Nukada titanyl phthalocyanine] at an angle of  $23.5^{\circ} \pm 0.2^{\circ}$ ." Thus, based on applicants' comments and the statement in the Rule 132 declaration, it is not clear what is considered a "peak" in an X-ray diffraction spectrum. Accordingly, it is not clear whether the X-ray diffraction spectra shown in the "Figures" provide an adequate description of the peak at a Bragg angle of  $23.5^{\circ} \pm 0.2^{\circ}$  recited in instant claims 1 and 28.

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(2) Instant claims 1 and 28 also recite that the titanyl phthalocyanine X-ray diffraction spectrum has "a peak at an angle of  $9.5^\circ$  and a peak at an angle of  $9.7^\circ$ ."

The originally filed specification does not provide an adequate written description of such peaks at a Bragg angle of  $9.5^\circ$  and at a Bragg angle of  $9.7^\circ$ . As discussed in item (1) above, in synthesis example 1, the originally filed specification discloses that the resultant titanyl phthalocyanine has an X-ray diffraction spectrum having a maximum peak at a Bragg ( $2\theta$ ) angle of  $27.2^\circ \pm 0.2^\circ$  and a lowest peak at an angle of  $7.3^\circ \pm 0.2^\circ$ . The originally filed specification states that no peaks are observed at angles from " $7.4^\circ$  to  $9.4^\circ$  (i.e., the interval between the lowest angle peak to a next peak at a high angle side is  $2.0^\circ$  or more)" and no peak is observed at an angle of  $26.3^\circ$ . See the originally filed specification at page 66, lines 5-14, and Fig. 13. Table 1 at page 71 of the originally specification reports that the X-ray diffraction spectrum of the titanyl phthalocyanine in synthesis example 1 has a maximum peak at a Bragg ( $2\theta$ ) angle of  $27.2^\circ$ , a lowest peak at an angle of  $7.3^\circ$ , a peak at an angle of  $9.4^\circ$ , a peak at an angle of  $9.6^\circ$ , no "peak in a range of  $7.4^\circ$  to  $9.6^\circ$ ," and no peak at an angle of  $26.3^\circ$ . The originally filed specification does not appear to provide any description of a

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titanyl phthalocyanine X-ray diffraction spectrum having a peak at an angle of  $9.5^{\circ}$  or a peak at an angle of  $9.7^{\circ}$  as recited in instant claims 1 and 28.

In the amendment filed on Sep. 26, 2006, applicants assert that the limitation that the peak at an angle of  $9.5^{\circ}$  and the peak at an angle of  $9.7^{\circ}$  are "supported by the specification, the Figures and Examples." However, applicants' assertion does not appear to be supported by the evidence of record. Applicants have not indicated where in the originally filed specification, by page and line number, there is a description of the two peaks at  $9.5^{\circ}$  and  $9.7^{\circ}$ . Nor have applicants provided any objective evidence to show that the X-ray diffraction spectra in the "Figures" exhibit such peaks. As noted supra, the originally filed specification discloses that the X-ray diffraction spectrum in Fig. 13 exhibits peaks at angles of  $9.4^{\circ}$  and  $9.6^{\circ}$ . For the reasons discussed above, it is not clear what is considered a peak in an X-ray diffraction spectrum. Thus, it is not clear whether the X-ray diffraction spectra shown in the "Figures" provide an adequate description of the peak at a Bragg angle of  $9.5^{\circ}$  and the peak at an angle of  $9.7^{\circ}$  recited in instant claims 1 and 28.

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9. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

10. Claims 1, 7, 8, 10-14, 16-20, 22, 23, and 28 are rejected under 35 U.S.C. 103(a) as being unpatentable over US 2002/0076633 A1 (Niimi'633), as evidenced by applicants' admission at page 87, lines 22-23, of the instant specification (applicants' admission I) and by the ACS File Registry RN 26201-32-1, combined with: (1) US 5,776,650 (Hashimoto); and (2) US 6,623,899 B2 (Takaya).

Niimi'633 discloses an electrophotographic photoreceptor comprising an electroconductive substrate; an undercoat layer; a charge generation layer; a charge transport layer formed on the charge generation layer using a halogen-free solvent; and a protective layer. The charge generation layer comprises a polyvinyl butyral resin and a bisazo charge generation material. The charge transport layer is obtained by coating the charge generation layer with a coating solution comprising a binder resin, a charge transport compound, and the solvent tetrahydrofuran. The protective layer comprises a charge transport polymer comprising a triarylamine moiety in a side chain and particulate alumina filler having a specific resistivity of  $2.5 \times 10^{12} \Omega \cdot m$ . See refining example 6 at

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pages 24-25, paragraphs 0346-0351; pages 25-26, paragraphs 0358 to 0367; and example 6 at page 27, paragraphs 0380-0381. The Niimi'633 charge transport layer meets the charge transport layer limitations recited in instant claims 1, 16, and 28. The protective layer in example 6 meets the protective layer limitations recited in instant claims 10-12 and 14.

Niimi'633 does not identify its alumina filler as a "α-alumina" as recited in instant claim 13. However, as discussed supra, the Niimi'633 alumina filler has a specific resistivity of  $2.5 \times 10^{12} \Omega \cdot m$ . The instant specification discloses a "α-alumina" having a specific resistivity of  $2.5 \times 10^{12} \Omega \cdot m$ . Instant specification, page 87, lines 22-23. Because the Niimi'633 alumina filler has the same specific resistivity as the "α-alumina" disclosed in the instant specification and is used for the same purpose as a filler in a protective layer for a photoreceptor, it is reasonable to presume that the Niimi'633 alumina filler is an "α-alumina" as recited in instant claim 13. The burden is on applicants to prove otherwise. In re Fitzgerald, 205 USPQ 594 (CCPA 1980).

Niimi'633 further discloses that its photoreceptor may be used as the photoreceptor in an image forming apparatus or a process cartridge. The image forming apparatus comprises at least one image forming unit, which comprises a photoreceptor 1,

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a charger **8**, a light irradiator **5**, an image developer **11**, and a transfer device **15**. Page 4, paragraph 0061; Fig. 3; and page 21, paragraphs 0300-0305. Niimi'633 teaches that the light irradiator is preferably a laser diode or a light emitting diode as recited in instant claim 19, and that the charger is preferably a contact charger or a proximity charger as recited in instant claims 20 and 22. Page 4, paragraph 0062; and page 21, paragraph 0304. Niimi'633 further teaches that the image forming apparatus can comprise a plurality of image forming units. See Fig. 7, and pages 22-23, paragraphs 0321-0324. The Niimi'633 process cartridge comprises a photoreceptor **43**, and at least one of a charger **40**, an image irradiator **41**, or an image developer **45**. Page 5, paragraph 0063; Fig. 5; and page 22, paragraph 0319.

Niimi'633 further teaches that the charge generation material in the charge generation layer can preferably be a titanyl phthalocyanine pigment having an X-ray diffraction spectrum in which a highest peak is observed at Bragg  $2\theta$  angle of  $27.2^\circ \pm 0.2^\circ$  when a specific X-ray of Cu-K $\alpha$  having a wavelength of 1.531 Å irradiates the titanyl phthalocyanine pigment. Paragraph 0151 and example 28 at page 32, paragraph 0476. The Niimi'633 titanyl phthalocyanine has an X-ray diffraction spectrum as shown in Fig. 6. The diffraction

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spectrum further has a lowest peak at an angle of  $7.4^\circ$ , a peak at an angle of  $9.5^\circ$ , a peak at an angle of  $9.7^\circ$ , a peak at an angle of  $23.5^\circ$ , and no peak at an angle of  $26.3^\circ$ . See Fig. 6. The interval between the peaks at angles of  $7.4^\circ$  and  $9.5^\circ$  meet the limitation "an interval . . . is not less than  $2.0^\circ$ " recited in instant claims 1 and 28. The peaks at angles of  $27.2^\circ$ ,  $7.4^\circ$ ,  $9.5^\circ$ ,  $9.7^\circ$ , and  $23.5^\circ$ , and no peak at  $26.3^\circ$  meet the peaks in the "X-ray diffraction spectrum" recited in instant claims 1 and 28. The locations of the peaks at angles  $7.4^\circ$ ,  $9.5^\circ$ ,  $9.7^\circ$ , and  $23.5^\circ$  were determined by measuring the positions of the peaks with a ruler and correlating the positions with the x-axis in Fig. 6. Niimi'633 does not explicitly identify the chemical structure of its titanyl phthalocyanine. However, as evidenced by the ACS File Registry RN 26201-32-1, it is well known that titanyl phthalocyanine has a chemical structure that is within the compositional limitations of formula (1) recited in instant claim 28, when the indexes m, n, j, and k are 0. Thus, Niimi'633 titanyl phthalocyanine meets the X-ray diffraction spectrum limitations and chemical structure recited in instant claims 1 and 28.

As discussed supra, the Niimi'633 X-ray diffraction spectrum is obtained using a Cu-K $\alpha$  X-ray having a wavelength of  $1.541 \text{ \AA}$ , not  $1.542 \text{ \AA}$ , as recited in instant claims 1 and 28.



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However, as discussed supra, the X-ray diffraction spectrum of the Niimi'633 titanyl phthalocyanine pigment meets the "X-ray diffraction spectrum" recited in instant claims 1 and 28. Thus, it is reasonable to conclude that the X-ray diffraction spectrum disclosed in Niimi'633 is the same as that obtained when a Cu-K $\alpha$  X-ray having a wavelength of 1.542 Å is used. The burden is on applicants to prove otherwise. In re Fitzgerald, 205 USPQ 594 (CCPA 1980).

Niimi'633 does not exemplify a charge generation layer comprising its titanyl phthalocyanine pigment having an average particle diameter as recited in the instant claims. However, Niimi'633 exemplifies a charge generation mixture comprising its titanyl phthalocyanine and polyvinyl butyral resin. See example 28 at paragraph 0476. Niimi'633 teaches that the charge generation layer is prepared by mixing the charge generation material with a proper solvent and binder resin and dispersing the mixture with "a ball mill . . . to prepare a coating liquid." Paragraphs 0154-0157.

Hashimoto teaches a method of preparing a charge generation dispersion liquid for forming a charge generation layer comprising the step of dispersing a charge generation pigment or dye and a binder resin with a ball-shaped pulverizing media in a dispersing solvent to an average particle size of about 0.1 to

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0.3  $\mu\text{m}$ . Col. 2, lines 52-68. Hashimoto exemplifies forming charge generation layers with said charge generation dispersion liquid where the average particle size of the organic pigment or dye dispersoids is either 0.15  $\mu\text{m}$  or 0.18  $\mu\text{m}$ . See the 1<sup>st</sup> and 2<sup>nd</sup> embodiments at col. 6, line 33-64, and col. 7, lines 26-30, and in Table 1 at col. 8. The average particle sizes of about 0.1 to 0.3  $\mu\text{m}$ , e.g., 0.15  $\mu\text{m}$  or 0.18  $\mu\text{m}$ , are within the particle diameter limitation of "not greater than 0.3  $\mu\text{m}$ " recited in instant claims 1 and 28. Hashimoto teaches that the charge generation pigments or dyes "are not specifically limited as far as the pigments or the dyes may function as a charge generating agent in a charge generation layer. For example, pigments such as phthalocyanine pigments . . ." Col. 4, lines 45-50.

According to Hashimoto, when the organic pigment or dye is dispersed in a resin binder as taught by Hashimoto to an average particle size of about 0.1 to 0.3  $\mu\text{m}$ , the "pigment or dye dispersoids are prevented from coagulating for a time period long enough to cause no problems in practical use of the dispersion liquid." Col. 4, lines 20-28. Hashimoto teaches that its dispersion liquid "exhibits excellent stability of the pigment or dye dispersoids, facilitates manufacturing electro-photographic photoconductors having a charge generation layer which exhibits excellent photographic properties." Col. 4,

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lines 29-33. The photoconductor also has improved stability.

Col. 2, lines 41-43.

It would have been obvious for a person having ordinary skill in the art, in view of the teachings of Niimi'633 and Hashimoto, to prepare a charge generation dispersion coating solution comprising the Niimi'633 titanyl phthalocyanine pigment and polyvinylbutyral resin, as taught by Hashimoto, such that the resultant dispersion solution comprises titanyl phthalocyanine pigment dispersoids having an average particle size of about 0.1 to 0.3  $\mu\text{m}$ , e.g., 0.15  $\mu\text{m}$  or 0.18  $\mu\text{m}$ , and to use the resultant dispersion solution to form the charge generation layer in the photoreceptor disclosed by Niimi'633. That person would have had a reasonable expectation of successfully obtaining an electrophotographic photoreceptor, an image forming apparatus, and a process cartridge that have improved stability and excellent photoconductive properties as taught by Hashimoto.

Instant claim 7 is written in product-by-process format. The combined teachings of Niimi'633 and Hashimoto do not disclose that the charge generation layer is formed by the method recited in the instant claim 7. However, as discussed above, the combined teachings of Niimi'633 and Hashimoto render obvious a titanyl phthalocyanine pigment having an average

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particle size of about 0.1 to 0.3  $\mu\text{m}$ , e.g., 0.15  $\mu\text{m}$  or 0.18  $\mu\text{m}$ . The average particle sizes of 0.15 or 0.18  $\mu\text{m}$  meet the average particle size limitation of "not greater than 0.3  $\mu\text{m}$ " recited in instant claim 7. Because the average particle size of 0.15 or 0.18  $\mu\text{m}$  is much smaller than the average particle size limitation of not greater than 0.3  $\mu\text{m}$  recited in instant claim 7, it is reasonable to conclude that the average particle size of 0.15 or 0.18  $\mu\text{m}$  meets the particle size standard deviation of "not greater than 0.2  $\mu\text{m}$ " recited in instant claim 7. Thus, it appears that the charge generation layer rendered obvious over the combined teachings of Niimi'633 and Hashimoto is the same or substantially the same as the instantly recited charge generation layer made by the process recited in instant claim 7. The burden is on applicants to prove otherwise. In re Marosi, 218 USPQ 289 (Fed. Cir. 1983); In re Thorpe, 227 USPQ 964 (Fed. Cir. 1985); MPEP 2113.

Instant claim 8 is written in product-by-process format. Niimi'633 does not disclose that its titanyl phthalocyanine material is obtained by the method recited in instant claim 8. However, the Niimi'633 titanyl phthalocyanine pigment exhibits an X-ray diffraction spectrum that meets the limitations recited in instant claims 1 and 28. The titanyl phthalocyanine pigment

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average particle size of 0.15  $\mu\text{m}$  or 0.18  $\mu\text{m}$  rendered obvious over the combined teachings of Niimi'633 and Hashimoto meets the particle size limitation of "not greater than 0.3  $\mu\text{m}$ " recited in instant claims 1 and 28. Therefore, it appears that the titanyl phthalocyanine pigment rendered obvious over the combined teachings of Niimi'633 and Hashimoto is the same or substantially the same as the instantly recited titanyl phthalocyanine crystal made by the process steps recited in the instant claim. The burden is on applicants to prove otherwise. Marosi; Thorpe; MPEP 2113.

Niimi'633 also does not exemplify a photoreceptor comprising an undercoat layer having the surface roughness as recited in the instant claims. However, Niimi'633 does not limit the type of undercoat layer used. Page 12, paragraph 0180; and reference claim 22.

Takaya teaches the use of a particular intermediate layer located between the charge generation layer and the electroconductive substrate of an electrophotographic photosensitive member. Takaya discloses that the intermediate layer has a layer thickness of at least 0.5  $\mu\text{m}$  and comprises aggregated particles of  $\text{Al}_2\text{O}_3 \cdot n\text{H}_2\text{O}$ , where n is a number of at least 0 representing "a degree of hydration." Col. 3, lines 55-63. Takaya teaches that the intermediate layer

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preferably has a 10-point surface roughness  $R_z$  (according to JIS B06010) of "0.1 to 1  $\mu\text{m}$  so as to provide improved function of preventing the occurrence of interference fringes sometimes encountered in an electrophotographic apparatus of a digital scheme using coherent light such as laser light as exposure light." Col. 7, lines 1-8. Takaya exemplifies an intermediate layer having a 10-point surface roughness  $R_z$  of 0.5  $\mu\text{m}$ . See, for example, example 1, col. 10, lines 13-27. Takaya discloses that its intermediate layer "can be formed in a crack-free state inexpensively and without requiring a special technique by using a coating liquid of a good storage stability." Col. 3, lines 34-37. According to Takaya, prior art intermediate layers comprising a polyamide resin are "liable to have an electrical resistance which is liable to change depending on environmental changes, so that it has been difficult to provide an electrophotographic photosensitive member having stable and excellent potential characteristics in all environments ranging from low temperature/low humidity to high temperature/high humidity." Col. 2, lines 14-27. Takaya discloses that photosensitive members comprising its particular intermediate layer solve the above-mentioned problems of the prior art. Col. 3, lines 27-30. Takaya discloses that such photosensitive members exhibit "excellent potential characteristic and image

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forming characteristic free from difficulties, such as lower image density or black spots and fog, over a variety of temperature and humidity environment conditions even at a smaller thickness of photosensitive layer." Col. 3, lines 39-46; example 1, col. 11, lines 12-19; and Table 1 at col. 13, example 1.

It would have been obvious for a person having ordinary skill in the art, in view of the teachings in Takaya, to use the undercoat layer taught by Takaya having a 10-point surface roughness  $R_z$  of  $0.5 \mu\text{m}$  as the undercoat layer in the photoreceptor rendered obvious over the combined teachings of Niimi'633 and Hashimoto, and to use the resultant photoreceptor in the image forming apparatus and process cartridge rendered obvious over the combined teachings of Niimi'633 and Hashimoto. That person would have had a reasonable expectation of successfully obtaining an electrophotographic photoreceptor, an image forming apparatus, and a process cartridge that prevent the occurrence of interference fringes and exhibit excellent potential characteristics and image forming characteristics free from difficulties over a variety of temperature and humidity environment conditions as disclosed by Takaya.

The combined teachings of Niimi'633, Hashimoto, and Takaya meet the surface roughness - particle size relationships recited

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in instant claims 1 and 28. As discussed supra, the titanyl phthalocyanine pigment particles in the charge generation layer rendered obvious over the combined teachings of Niimi'633 and Hashimoto have an average particle size of 0.15 or 0.18  $\mu\text{m}$ . The average particle sizes of 0.15 and 0.18  $\mu\text{m}$  are smaller than the Takaya undercoat layer 10-point surface roughness of 0.5  $\mu\text{m}$  and are also not greater than  $2/3$  of the roughness of 0.5  $\mu\text{m}$  (i.e., 0.33  $\mu\text{m}$ ), as recited in instant claims 1 and 28.

11. Claims 20-22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Niimi'633, as evidenced by applicants' admission I and by the ACS File Registry RN. 26201-32-1, combined with: (1) Hashimoto; and (2) Takaya, as applied to claim 20 above, further combined with US 2002/0051654 A1 (Niimi'654).

Niimi'633, as evidenced by applicants' admission I and by the ACS File Registry RN 26201-32-1, combined with (1) Hashimoto and (2) Takaya, renders obvious an image forming apparatus as described in paragraph 10, which is incorporated herein by reference.

As discussed in paragraph 10 above, Niimi'633 teaches that the charger in its image forming apparatus can preferably be a proximity charger as recited in instant claim 20. Page 4, paragraph 0062. However, Niimi'633 does not teach that the



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proximity charger forms a gap between the photoreceptor and the charger of not greater than 200  $\mu\text{m}$ , as recited in instant claim 21.

Niimi'654 teaches a proximity charging device comprising a charger roller **81** that comprises gap members **41a** and **41b** at the end of the roller. See Figs. 1 and 3, and paragraphs 0087 and 0089. The gap formed between the charger roller and the photoreceptor is preferably from 10 to 200  $\mu\text{m}$ , i.e., the thickness of the gap members, which meets the charger limitations recited in instant claim 21. Page 3, paragraph 0034, and page 6, paragraph 0103. According to Niimi'654, "[w]hen the thickness of the gap members is too thin, there is a possibility that the charger **81** contacts the photoreceptor . . . the toner remaining on the surface of the photoreceptor . . . tends to adhere to the charger **81**. When the thickness is too thick, the voltage applied to the charger **81** has to be increased, resulting in increase of electric power consumption." Paragraph 0103. Niimi'654 further discloses that when charging, the charger applies a DC voltage overlapped with an AC voltage to the photoreceptor to avoid uneven charging, which meets the charger limitation recited in instant claim 22. Page 9, paragraph 0152; and page 26, paragraph 0472. According to Niimi'654, its proximity charger does "not cause uneven

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charging even when used for a long period of time, resulting in formation of good images for a long period of time."

Paragraph 0030.

It would have been obvious for a person having ordinary skill in the art, in view of the teachings of Niimi'654, to use Niimi'654 proximity charger as the proximity charger in the image forming apparatus rendered obvious over the combined teachings of Niimi'633, Hashimoto, and Takaya. That person would have had a reasonable expectation of successfully obtaining an image forming apparatus that does "not cause uneven charging even when used for a long period of time, resulting in formation of good images for a long period of time."

12. Claims 1, 7, 8, 10, 14, 15, 17, 19, 23, and 28 are rejected under 35 U.S.C. 103(a) as being unpatentable over US 6,399,262 B1 (Oshiba) combined with Japanese Patent 2000-319538 (JP'358), as evidenced by Ladd et al., Structure Determination by X-ray Diffraction, p. 426 (Ladd). See the Japanese Patent Office (JPO) machine-assisted translation of JP'358 for cites.

Oshiba discloses an electrophotographic photoreceptor comprising an aluminum cylinder, as the electroconductive substrate, an intermediate layer, a charge generation layer, a charge transport layer, and a protective layer. The aluminum

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cylinder has a 10-point average surface roughness (Rz) of 1.0  $\mu\text{m}$ , which is subjected to an alumite process. Col. 30, lines 1-24; col. 39, line 20, to col. 40, line 37; and example 26 at col. 41. The alumite process comprises the step of subjecting the aluminum cylinder to anodic oxidation treatment. Col. 33, lines 39-48. The Oshiba conductive aluminum cylinder meets the conductive substrate limitation recited in instant claim 15. The surface layer comprises a siloxane resin that has "charge transportability." See example 26. The Oshiba surface layer meets the compositional limitations recited in instant claims 10 and 14.

The charge transport layer in the photoreceptor in example 26 of Oshiba is obtained by coating the charge generation layer with a coating solution comprising a binder resin, a charge transport compound, and the solvent 1,2-dichlorethane. Oshiba further teaches that the solvent can most preferably be, in addition to 1,2-dichloroethane, dichlormethane or methyl ethyl ketone. Col. 30, lines 47-49. The solvent methyl ethyl ketone meets the non-halogen solvent compositional limitations recited in instant claims 1 and 28. The choice of methyl ethyl ketone from a list of three solvents would have been obvious to a person having ordinary skill in the art.

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According to Oshiba, when a photoreceptor comprises the Oshiba conductive substrate and surface layer, the photoreceptor exhibits high surface hardness, high wear resistance, and high flaw resistance. The photoreceptor exhibits consistent electrophotographic properties at high temperature and high humidity during repeated use. The photoreceptor repeatedly produces excellent images, and does not "form a moire during the formation of digital images employing a laser beam and the like." Col. 3, lines 8-15.

Oshiba further discloses that its photoreceptor may be used as the photoreceptor in an image forming apparatus or a process cartridge. The image forming apparatus comprises a photoreceptor **10**, a charger **12**, an exposing unit **13**, developing units **14**, and a transfer device **18**. Col. 31, line 42, to col. 32, line 37. Oshiba teaches that the exposing unit **13** comprises a laser diode as the exposure light as recited in instant claim 19. Col. 31, lines 57-59. Oshiba further teaches that the image forming apparatus comprises a detachable process cartridge that comprises the photoreceptor **10**, the charger **40**, a separation unit, and a cleaning unit. Fig. 1 and col. 32, lines 63-65.

Oshiba does not exemplify a charge generation layer comprising a polyvinyl acetal resin and a charge generation

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material having an average particle diameter as recited in the instant claims. However, Oshiba discloses that the charge generation layer can comprise a phthalocyanine pigment as the charge generation material and a binder resin. Oshiba does not limit the type of binder resin used. Col. 27, lines 61-62; and col. 28, line 49.

JP'538 teaches a titanyl phthalocyanine pigment that meets the compositional limitations of the chemical formula recited in instant claim 28. Translation, paragraph 0008. The titanyl phthalocyanine pigment has an X-ray diffraction spectrum in which a highest peak is observed at Bragg  $2\theta$  angle of  $27.2^\circ \pm 0.2^\circ$  and a lowest peak at an angle of  $7.3^\circ$ , when a specific X-ray of Cu-K $\alpha$  having a wavelength of 1.531 Å irradiates the titanyl phthalocyanine pigment. Translation, paragraph 0012, and example 1 in paragraphs 0047-0052 and in Table 1, and Fig. 5. JP'538 teaches that there are no peaks between Bragg angles  $7.3^\circ$  and  $9.4^\circ$ . Translation, paragraph 0012. The interval between the peaks meets the limitation of "an interval . . . is not less than  $2.0^\circ$ " recited in instant claims 1 and 28. The diffraction spectrum further has a peak at an angle of  $9.5^\circ$ , a peak at an angle of  $9.7^\circ$ , a peak at an angle of  $23.5^\circ$ , and no peak at an angle of  $26.3^\circ$ . See Fig. 5. The peaks at angles of  $27.2^\circ$ ,  $7.3^\circ$ ,  $9.5^\circ$ ,  $9.7^\circ$ , and  $23.5^\circ$ , and no peak at an angle of  $26.3^\circ$  meet the

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peaks in the "X-ray diffraction spectrum" recited in instant claims 1 and 28. The locations of the peaks at angles  $9.5^\circ$ ,  $9.7^\circ$ , and  $23.5^\circ$  were determined by measuring the positions of the peaks with a ruler and correlating the positions with the x-axis in Fig. 5. JP'538 further discloses forming a charge generating coating solution by dispersing a particular polyvinyl butyral binder resin and the titanyl phthalocyanine in a solvent using a ball mill. Translation, paragraph 0058. According to JP'538, when its titanyl phthalocyanine pigment is used as the charge generation material in the charge generation layer in a photoreceptor, the resulting photoreceptor has high photosensitivity even after repeated use. The chargeability of the photoreceptor does not decrease and the residual potential does not increase after repeated use. Translation, paragraphs 0006 and 0070.

The JP'538 reported wavelength of  $1.514 \text{ \AA}$  appears to be a typographic error. The Cu-K $\alpha$  wavelength of  $1.514 \text{ \AA}$  does not appear to exist. It is well known that the Cu-K $\alpha$  spectra line is a doublet consisting of  $\alpha_1$  ( $\lambda = 1.5405$ ) and  $\alpha_2$  ( $\lambda = 1.5443$ ). The weighted mean K $\alpha$  line is  $1.542 \text{ \AA}$ , which is the value normally used in Cu-K $\alpha$  X-ray diffraction. See Ladd, p. 426. Accordingly, because JP'538 teaches using the X-ray of Cu-K $\alpha$  and that Cu-K $\alpha$  is known in the art to have mean wavelength of

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1.542 Å, it is reasonable to presume that the X-ray diffraction spectrum disclosed in JP'538 is determined with Cu-K $\alpha$  having a wavelength of 1.542 Å, as recited in the instant claims. The burden is on applicants to prove otherwise. Fitzgerald, supra.

JP'538 does not exemplify a charge generation layer coating solution comprising its titanyl phthalocyanine pigment having an average particle diameter as recited in the instant claims. However, as discussed supra, JP'538 exemplifies a charge generation layer coating solution obtained by dispersing a particular polyvinyl butyral binder resin and its titanyl phthalocyanine in a solvent using a ball mill.

Hashimoto teaches a method of preparing a charge generation dispersion liquid for forming a charge generation layer comprising the step of dispersing a charge generation pigment or dye with a binder resin with a ball-shaped pulverizing media in a dispersing solvent to an average particle size of about 0.1 to 0.3  $\mu\text{m}$ , e.g., 0.15 or 0.18  $\mu\text{m}$ . The average particle sizes of about 0.1 to 0.3  $\mu\text{m}$ , e.g., 0.15 or 0.18  $\mu\text{m}$ , are within the particle diameter limitation of "not greater than 0.3  $\mu\text{m}$ " recited in instant claims 1 and 28. The discussion of Hashimoto in paragraph 10 above is incorporated herein by reference.

It would have been obvious for a person having ordinary skill in the art, in view of the teachings of Oshiba, to use

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methyl ethyl ketone as the solvent in forming the charge transport layer in the photoreceptor disclosed by Oshiba. It would have also been obvious for that person, in view of the teachings of JP'538 and Hashimoto, to prepare a charge generation dispersion coating solution comprising the JP'538 titanyl phthalocyanine pigment and its particular polyvinylbutyral resin, as taught by Hashimoto, such that the resultant dispersion solution comprises titanyl phthalocyanine pigment dispersoids having an average particle size of about 0.1 to 0.3  $\mu\text{m}$ , e.g., 0.15 or 0.18  $\mu\text{m}$ , and to use the resultant dispersion solution to form the charge generation layer in the photoreceptor rendered obvious over Oshiba. That person would have had a reasonable expectation of successfully obtaining an electrophotographic photoreceptor, an image forming apparatus, and a process cartridge that have high photosensitivity and stable charging properties and residual potential properties after repeated use, as taught by JP'538, and that have further improved stability and excellent photoconductive properties as taught by Hashimoto.

Instant claim 7 is written in product-by-process format. The combined teachings of JP'538 and Hashimoto do not disclose that the charge generation layer is formed by the method recited in the instant claim 7. However, as discussed above, the



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combined teachings of JP'538 and Hashimoto render obvious a titanyl phthalocyanine pigment having an average particle size of about 0.1 to 0.3  $\mu\text{m}$ , e.g., 0.15  $\mu\text{m}$  or 0.18  $\mu\text{m}$ . The average particle sizes of 0.15 or 0.18  $\mu\text{m}$  meet the average particle size limitation of "not greater than 0.3  $\mu\text{m}$ " recited in instant claim 7. Because the average particle size of 0.15 or 0.18  $\mu\text{m}$  is much smaller than the average particle size limitation of not greater than 0.3  $\mu\text{m}$  recited in instant claim 7, it is reasonable to conclude that the average particle size of 0.15 or 0.18  $\mu\text{m}$  meets the particle size standard deviation of "not greater than 0.2  $\mu\text{m}$ " recited in instant claim 7. Thus, it appears that the charge generation layer rendered obvious over the combined teachings of JP'538 and Hashimoto is the same or substantially the same as the instantly recited charge generation layer made by the process recited in instant claim 7. The burden is on applicants to prove otherwise. In re Marosi, 218 USPQ 289 (Fed. Cir. 1983); In re Thorpe, 227 USPQ 964 (Fed. Cir. 1985); MPEP 2113.

Instant claim 8 is written in product-by-process format. JP'538 does not disclose that its titanyl phthalocyanine material is obtained by the method recited in instant claim 8. However, the JP'538 titanyl phthalocyanine pigment exhibits an

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X-ray diffraction spectrum that meets the limitations recited in instant claims 1 and 28. The titanyl phthalocyanine pigment average particle size of 0.15  $\mu\text{m}$  or 0.18  $\mu\text{m}$  rendered obvious over the combined teachings of JP'538 and Hashimoto meets the particle size limitation of "not greater than 0.3  $\mu\text{m}$ " recited in instant claims 1 and 28. Therefore, it appears that the titanyl phthalocyanine pigment rendered obvious over the combined teachings of JP'538 and Hashimoto is the same or substantially the same as the instantly recited titanyl phthalocyanine crystal made by the process steps recited in the instant claim. The burden is on applicants to prove otherwise. Marosi; Thorpe; MPEP 2113.

The combined teachings of Oshiba, JP'538, and Hashimoto meet the surface roughness - particle size relationships recited in instant claims 1 and 28. As discussed supra, the titanyl phthalocyanine pigment particles in the charge generation layer rendered obvious over the combined teachings of JP'538 and Hashimoto have an average particle size of 0.15  $\mu\text{m}$  or 0.18  $\mu\text{m}$ . The average particle sizes of 0.15 and 0.18  $\mu\text{m}$  are smaller than the Oshiba aluminum cylinder surface roughness of 1.0  $\mu\text{m}$  and are also not greater than 2/3 of the roughness of 1.0  $\mu\text{m}$  (i.e., 0.66  $\mu\text{m}$ ), as recited in instant claims 1 and 28.

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13. Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over Oshiba combined with (1) JP'538, as evidenced by Ladd, and (2) Hashimoto, as applied to claim 1 above, further combined with further with US 5,496,671 (Tamura).

Oshiba combined with (1) JP'538, as evidenced by Ladd, and (2) Hashimoto renders obvious an electrophotographic photoreceptor as described in paragraph 12, which is incorporated herein by reference.

Oshiba does not exemplify a charge transport layer comprising a charge transport polymer as recited in instant claim 9. However, Oshiba does not limit the type of charge transport layer used. See reference claim 4.

Tamura teaches a charge transport layer comprising a charge transport polymer comprising a triarylamine moiety in the side chain of the polymer, which meets the charge transport polymer limitation recited in instant claim 9. The charge transport layer is formed by coating the charge generation layer with a solution comprising the carbon-carbon double bond containing triarylamine compound CTM-3, a carbon-carbon double bond-containing monomer, and toluene, and photo-setting the coating to form the charge transport polymeric layer. CTM-3 at col. 7; synthesis example 1 at col. 42; and example 1 at col. 43, lines 15-26. The Tamura charge transport layer meets the charge

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transport layer limitations recited in instant claim 9.

According to Tamura, an electrophotographic photoconductor comprising its charge transport layer has improved mechanical strength and high photosensitivity and durability. Col. 1, lines 57-60.

It would have been obvious for a person having ordinary skill in the art, in view of the teachings in Tamura, to use the charge transport layer taught by Tamura as the charge transport layer in the photoreceptor rendered obvious over the combined teachings of Oshiba, JP'538, and Hashimoto. That person would have had a reasonable expectation of successfully obtaining an electrophotographic photoreceptor that has improved mechanical strength and high photosensitivity and durability as taught by Tamura.

14. Applicants' arguments filed on Sep. 26, 2006, as applicable to the rejections set forth in paragraphs 10-13 above, have been fully considered but they are not persuasive.

Applicants' assertions that none of references teaches or suggests a titanyl phthalocyanine pigment having an X-ray diffraction spectrum having peaks at angles of  $9.5^\circ$ ,  $9.7^\circ$ , and  $23.5^\circ \pm 0.2^\circ$ , as recited in instant claims 1 and 28, are not persuasive. For the reasons in paragraphs 10 and 12 above,

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Niimi'633 and JP'538 each teaches a titanyl phthalocyanine that has an X-ray diffraction spectrum that meets the spectrum recited in instant claims 1 and 28.

Applicants further assert that none of the references discloses or suggests the instantly claimed photoreceptor for applicants' various reasons.

Applicants' assertion is not persuasive. The reasons for combining the references do not have to be those of applicants. For the reasons discussed in the rejections in paragraphs 10 and 12 above, Hashimoto provides reason, suggestion, and motivation to make and use a charge generation layer coating solution comprising the titanyl phthalocyanine pigment taught by either Niimi'633 or JP'538, as taught by Hashimoto, such that the resultant pigment dispersoids have an average particle size of about 0.1 to 0.3  $\mu\text{m}$ , such as 0.15 or 0.18  $\mu\text{m}$ . Takaya provides reason, suggestion, and motivation to use the intermediate layer as the intermediate layer in the photoreceptor rendered obvious over the combined teachings of Niimi'633 and Hashimoto. Furthermore, the combined teachings of Niimi'633, Hashimoto, and Takaya and the combined teachings of Oshiba, JP'358, and Hashimoto both render obvious photoreceptors that meet the compositional, particle size, and surface roughness limitations recited in the instant claims.

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Accordingly, the rejections set forth in paragraphs 10-13 stand.

15. Claims 1, 7-23, and 28 are provisionally rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1-10 and 12-18 and 20-27 of copending Application No. 10/804,067 (Application'067), as evidenced by that portion of the disclosure in Application'067 that supports the claimed subject matter in claims 1-18 and 20-27 of Application'067, and the ACS File Registry RN 26201-32-1.

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

Although the conflicting claims are not identical, they are not patentably distinct from each other because the subject matter recited in the claims of Application'067 renders the subject matter recited in the instant claims obvious.

Reference claims 2 and 3, which each depend directly from reference claim 1, recite an electrophotographic photoconductor comprising an electroconductive substrate, a charge generation layer, and a charge transport layer formed on the charge generation layer using a halogen-free solvent. The charge

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transport layer comprises a polycarbonate having a triarylamine structure that meets the polycarbonate resin recited in instant claim 9. The charge generation layer comprises a particular polyvinyl acetal resin and a charge generation material that has an average particle diameter smaller than the "surface roughness plane," where the plane is the electroconductive substrate or an interlayer disposed between the substrate and the charge generation layer, recited in reference claims 2 and 3, respectively. The "surface roughness plane" has the same meaning as "surface roughness" recited in the instant claims. Compare paragraph 6 above and Application'067, page 3, paragraph 0052. Reference claim 4, which depends on reference claim 1, requires that the average particle diameter of the charge generation material be 0.3  $\mu\text{m}$  or less and two-thirds or less than the surface roughness of the plane, which meets the particle size limitations recited in instant claims 1 and 28.

The subject matter recited in reference claims 5-10 and 12-18, which depend from reference claim 1, expressly meets the titanyl phthalocyanine, the process limitation, the charge transport polymer, the surface protective layer, the substrate, and non-halogenated solvent limitations recited in instant claims 1, 7, 8, 10-16, 28, and 29, respectively, but for the limitation that the X-ray diffraction spectrum has peaks at

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angles 9.5°, 9.7°, and 23.5° recited in instant claims 1 and 28, and the chemical structure recited in instant claim 28.

However, as evidenced by the ACS File Registry RN 26201-32-1, it is well known that titanyl phthalocyanine has a chemical structure that is within the compositional limitations of formula (1) recited in instant claim 28, when the indexes m, n, j, and k are 0. As discussed above, the peaks at the Bragg angles in the X-ray diffraction spectrum recited in Application'067 are within the scope of the X-ray diffraction spectrum recited in instant claims 28. That spectrum is also within the scope of the diffraction spectrum recited in instant claims 1 and 28, but for the peaks at 9.5°, 9.7°, and 23.5°. Furthermore, that portion of Application'067 that supports the titanyl phthalocyanine crystal recited in the reference claims teaches that such a titanyl phthalocyanine crystal has an X-ray diffraction spectrum that has peak at Bragg angles 9.5°, 9.7°, and 23.5°. See Application'067, preparation example at pages 50-52 and Fig. 6. When addressing the use of whether a claim in the application defines an obvious variation of an invention claimed in a patent, "those portions of the specification which support the patent claims may be also be examined and considered." See MPEP 804,II.B.1, p. 800-22 (MPEP 8<sup>th</sup> edition, Rev. Aug. 2006), citing In re Vogel, 164 USPA 619,



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622 (CCPA 1970). Thus, it is reasonable to presume that the titanyl phthalocyanine crystal recited in the reference claims of Application'067 has the chemical structure recited in instant claim 28 and has an X-ray diffraction spectrum that has peaks at the Bragg angles of  $9.5^{\circ}$ ,  $9.7^{\circ}$ , and  $23.5^{\circ}$  as shown in Application'067 Fig. 6 that meets the spectrum recited in instant claims 1 and 28. The burden is on applicants to prove otherwise. Fitzgerald, supra.

References 20 and 22-26 recite an image forming apparatus comprising an image forming unit that comprises a charging unit, a light-irradiating unit, a developing unit, and a transferring unit that meet the charging, light-irradiating unit, developing unit, and transporting unit limitations recited in instant claims 17 and 19-22. Reference 21, which depends on reference claim 20, further requires that the image forming apparatus comprise a plurality of image forming units that meets the apparatus limitation recited in instant claim 18. Reference claim 27 recites a process cartridge comprising at least one of charging unit, a light-irradiating unit, and a developing unit that meet the units limitations recited in instant claim 23. The apparatus and the process cartridge recited in the claims of Application'067 both comprise a photoconductor as recited in reference claim 1.

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It would have been obvious for a person having ordinary skill in the art, in view of the subject matter recited in the claims of Application'067, as evidenced by that portion of the disclosure in Application'067 that supports the claimed subject matter in claims of Application'067, and the ACS File Registry RN 26201-32-1, to make and use an electrophotographic photoconductor that meets the photoreceptor limitations recited in the instant claims, and to use the resultant photoconductor in the imaging apparatus and process cartridge recited in Application'067. That person would have had a reasonable expectation of successfully obtaining an electrophotographic photoconductor, an imaging apparatus, and a process cartridge that could be used successfully in an electrophotographic process to form toner images.

16. Claims 1, 8-10, 15-18, 20-23, and 28 are provisionally rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1-18 of copending Application No. 10/656,280 (Application'280), as evidenced by that portion of the disclosure in Application'280 that supports the claimed subject matter in claims 1-18 of Application'280, and the ACS File Registry RN 26201-32-1, in view of Takaya and US 4,734,348 (Suzuki).

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This is a provisional obviousness-type double patenting rejection.

Reference claim 8, which depends from claim 7, which in turn depends from reference claim 1, recites an image forming apparatus comprising an electrophotographic photoreceptor comprising an electroconductive substrate, a charge generation layer, and a charge transport layer formed on the charge generation layer using the non-halogen solvent of cyclic ethers or aromatic hydrocarbons. The charge transport layer meets the charge transport layer limitations recited in instant claims 1, 16, and 28. The charge generation layer comprises titanyl phthalocyanine crystals. The titanyl phthalocyanine crystal has an  $\text{CuK}\alpha$  1.542 Angstrom X-ray diffraction spectrum comprising a maximum peak at a Bragg angle of  $27.2^\circ \pm 0.2^\circ$  and a peak at a lowest Bragg angle of  $7.3^\circ \pm 0.2^\circ$  and peaks at  $9.4^\circ \pm 0.2^\circ$  and  $9.6^\circ \pm 0.2^\circ$ . No diffraction peak is observed within a range of from  $7.3^\circ$  to  $9.4^\circ$ . Reference claim 2, which depends from claim 1, requires that the X-ray diffraction spectrum comprise no peak at a Bragg angle of  $26.3^\circ$ , which meets the X-ray diffraction spectrum recited in instant claim 28.

The claims of Application'280 do not recite that the titanyl phthalocyanine crystal has the chemical structure in formula (1) recited in instant claim 28. Nor do the claims of

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Application'280 recite that the titanyl phthalocyanine crystal X-ray diffraction spectrum has a peak at the Bragg angle of  $23.5^{\circ} \pm 0.2^{\circ}$  as recited in instant claims 1 and 28. However, as evidenced by the ACS File Registry RN 26201-32-1, it is well known that titanyl phthalocyanine has a chemical structure that is within the compositional limitations of formula (1) recited in instant claim 28, when the indexes m, n, j, and k are 0. As discussed above, the peaks at the Bragg angles in the X-ray diffraction spectrum recited in Application'280 are within the scope of the X-ray diffraction spectrum recited in instant claims 1 and 28, but for the peak at  $23.5^{\circ}$ . Furthermore, that portion of Application'280 that supports the titanyl phthalocyanine crystal recited in the reference claims teaches that such a titanyl phthalocyanine crystal has an X-ray diffraction spectrum that has a peak at the Bragg angle of  $23.5^{\circ}$ . See Application'280, synthesis example 1 at pages 84-85, example 1 at pages 93-94, and Fig. 9. When addressing the use of whether a claim in the application defines an obvious variation of an invention claimed in a patent, "those portions of the specification which support the patent claims may be also be examined and considered." See MPEP 804,II.B.1, p. 800-22, citing In re Vogel, 164 USPA 619, 622 (CCPA 1970). Thus, it is reasonable to presume that the titanyl phthalocyanine crystal

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recited in the reference claims of Application'280 has the chemical structure recited in instant claim 28 and has an X-ray diffraction spectrum that has a peak at the Bragg angle of  $23.5^{\circ}$  as shown in Application'280 Fig. 9 that meets the spectrum recited in instant claims 1 and 28. The burden is on applicants to prove otherwise. Fitzgerald, supra.

Reference claim 3, which depends from reference claim 1, requires that the titanyl phthalocyanine crystals have an average primary particle size of less than  $0.3\text{ }\mu\text{m}$ , which is within the particle size limitation recited in instant claims 1 and 28. Reference claim 4, which depends from reference claim 1, requires that the charge transport layer comprise a polycarbonate having, on the main chain and/or side chain thereof, a triarylamine structure, which meets the charge transport polymer limitations recited in instant claim 9. Reference claim 5, which depend from reference claim 1, requires that the photoreceptor further comprise a protective layer that meets the surface protective layer limitations recited in instant claim 10. Reference claim 9, which depends on reference claim 1, requires that the conductive substrate comprise an oxide film formed by anodization. The anodized oxide film meets the substrate limitation recited in instant claim 15.

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Reference claims 1 and 11-15 recite that the image forming apparatus further comprises a charging unit, a light-irradiating unit, a developing unit, and a transferring unit that meet the charging, light-irradiating unit, developing unit, and transporting unit limitations recited in instant claims 17 and 20-22. Reference claim 10, which depends on reference claim 1, further requires that the image forming apparatus comprise a plurality of image forming units, thereby meeting the apparatus limitation recited in instant claim 18. Reference claim 15, which depends from reference claim 1, further requires that the apparatus comprise a detachable cartridge comprising the photoreceptor and a member selected from the group consisting of a charger, an irradiator, and a developer, which meets the unit limitations recited in instant claim 23.

Instant claim 8 is written in product-by-process format. The reference claims do not recite that the titanyl phthalocyanine material is obtained by the method recited in instant claim 8. However, the titanyl phthalocyanine material recited in the claims of Application'280 exhibits an X-ray diffraction spectrum that appears to meet the limitations recited in instant claims 1 and 28, and the particle size limitation of "not greater than 0.3  $\mu\text{m}$ " recited in instant claims 1 and 28. Therefore, it appears that the titanyl

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phthalocyanine material recited in the claims of Application'280 is the same or substantially the same as the instantly recited titanyl phthalocyanine crystal made by the process steps recited in the instant claim. The burden is on applicants to prove otherwise. Marosi; Thorpe; MPEP 2113.

The reference claims do not recite the presence of an intermediate layer located between the electroconductive substrate and the charge generation layer having a surface roughness as recited in the instant claims.

Takaya teaches the benefits of using of a particular intermediate layer located between the charge generation layer and the electroconductive substrate of an electrophotographic photosensitive member, which has a 10-point surface roughness Rz of 0.5  $\mu\text{m}$ . The discussion of Takaya in paragraph 10 above is incorporated herein by reference.

It would have been obvious for a person having ordinary skill in the art, in view of the subject matter recited in the reference claims in Application'280, as evidenced by that portion of the disclosure in Application'280 that supports the claimed subject matter in claims of Application'280 and the ACS File Registry RN 26201-32-1, and the teachings in Takaya, to use the intermediate layer taught by Takaya having a 10-point surface roughness Rz of 0.5  $\mu\text{m}$  between the electroconductive

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substrate and the charge generation layer in the photoreceptor recited in the reference claims of Application'280, wherein the titanyl phthalocyanine crystals have an average primary particle size of less than 0.3  $\mu\text{m}$ , and the charge transport layer is formed from a non-halogen solvent. That person would have had a reasonable expectation of successfully obtaining an electrophotographic photoreceptor, an image forming apparatus, and a process cartridge that prevent the occurrence of interference fringes and exhibit excellent potential characteristics and image forming characteristics free from difficulties over a variety of temperature and humidity environment conditions as disclosed by Takaya.

The reference claims also do not recite that the charge generation layer comprises a polyvinyl acetal binder resin.

Suzuki discloses a polyvinyl acetal resin that meets the limitations recited in instant claims 1, 17, 23, and 28. See Example 11 at col. 13. Suzuki discloses that the polyvinyl acetal resin can be used as the binder resin in a single photosensitive layer or in a charge generation layer. Col. 4, lines 10-13. Suzuki discloses that said polyvinyl acetal resin provides photosensitive layers having stably dispersed photoconductive particles and excellent electric properties,



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such as high sensitivity and low residual potential. Col. 2, lines 10-15, and col. 11, lines 56-60.

It would have been obvious for a person having ordinary skill in the art, in view of subject matter recited in the reference claims of Toda and the teachings of Suzuki, to use the Suzuki polyvinyl acetal resin as the binder resin in the charge generation layer in the photoreceptor rendered obvious over the subject matter recited in the reference claims of Toda, as evidenced by that portion of Toda that supports that subject matter claimed in Toda and the ACS File Registry RN 26201-32-1, combined with the teachings of Takaya. That person would have had a reasonable expectation of successfully obtaining a stable titanyl phthalocyanine dispersion and a photoreceptor, an image forming apparatus, and a process cartridge that have excellent electric properties, such as high sensitivity and low residual potential, as disclosed by Suzuki.

It would have been obvious for a person having ordinary skill in the art, in view of subject matter recited in the reference claims of Application'280 and the teachings of Suzuki, to use the Suzuki polyvinyl acetal resin as the binder resin in the charge generation layer in the photoreceptor rendered obvious over the subject matter recited in the reference claims of Application'280, as evidenced by that portion of the

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disclosure in Application'280 that supports the claimed subject matter in claims of Application'280 and the ACS File Registry RN 26201-32-1, combined with the teachings of Takaya. That person would have had a reasonable expectation of successfully obtaining a stable titanyl phthalocyanine dispersion and a photoreceptor, an image forming apparatus, and a process cartridge that have excellent electric properties, such as high sensitivity and low residual potential, as disclosed by Suzuki.

The subject matter recited in the reference claims of Application'280, as evidenced by that portion of the disclosure in Application'280 that supports the claimed subject matter in claims of Application'280 and the ACS File Registry RN 26201-32-1, combined with the teachings of Takaya and Suzuki meet the surface roughness - particle size relationships recited in instant claims 1 and 28. As discussed supra, the titanyl phthalocyanine crystal particles in the charge generation layer recited in the reference claims of Application'280 have an average primary particle diameter of less than 0.3  $\mu\text{m}$ . The average primary particle diameter of less than 0.3  $\mu\text{m}$  is smaller than the Takaya undercoat layer 10-point surface roughness of 0.5  $\mu\text{m}$  and is also not greater than  $2/3$  of the roughness of 0.5  $\mu\text{m}$  (i.e., 0.33  $\mu\text{m}$ ), as recited in instant claims 1 and 28.

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17. In the response filed on Sep. 26, 2006, applicants did not traverse the rejections over the copending applications set forth in paragraphs 15 and 16 above.

18. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Janis L. Dote whose telephone number is (571) 272-1382. The examiner can normally be reached Monday through Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mr. Mark Huff, can be reached on (571) 272-1385. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Any inquiry regarding papers not received regarding this communication or earlier communications should be directed to Supervisory Application Examiner Ms. Claudia Sullivan, whose telephone number is (571) 272-1052.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

JLD  
Oct. 25, 2006

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